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EXAMINER	
PHAN, HANH	

ART UNIT	PAPER NUMBER
2613	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/597,465	BOSCOLO ET AL.	
	Examiner	Art Unit	
	Hanh Phan	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 April 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-16 and 19-32 are rejected under 35 U.S.C. 102(e) as being anticipated by Blow et al (Pub. No.: US 2004/0076373)

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Regarding claims 1, 19, 25 and 31, referring to Figures 1 and 4-6, Blow et al teaches an optical pulse regenerator comprising:

an optical pulse reshaper (i.e., standard monomode fiber (SMF) 16 and dispersion compensating fiber (DCF) 18, Fig. 1) for broadening temporal widths and flattening center portions of an optical pulse (i.e., Fig. 1, page 4, paragraphs [0058]-[0064] and page 5, paragraphs [0071]-[0073]);

a saturable absorber (i.e., a non-linear loop mirror (NOLM) 14, Fig. 1) coupled to the optical pulse reshaper; and

an optical amplifier (i.e., optical amplifiers 20 and 22, Fig. 1) coupled to the optical pulse reshaper (i.e., Fig. 1, page 4, paragraphs [0058]-[0064], page 5, paragraphs [0071]-[0073], and page 7, paragraphs [0095]-[0098]).

Regarding claims 2 and 26, Blow et al further teaches where the optical pulse reshaper includes a section of normal dispersion fiber (i.e., Fig. 1, page 4, paragraphs [0058]-[0064] and page 5, paragraphs [0071]-[0073]).

Regarding claims 3 and 27-30, Blow et al further teaches wherein the section of normal dispersion fiber has a negative dispersion coefficient (i.e., Fig. 1, page 4, paragraphs [0058]-[0064] and page 5, paragraphs [0071]-[0073]).

Regarding claims 4 and 31, Blow et al further teaches wherein the saturable absorber (i.e., NOLM 14, Fig. 1) includes an unbalanced optical interferometer (i.e., Fig. 1, page 4, paragraphs [0058]-[0064], page 5, paragraphs [0071]-[0073], and page 7, paragraphs [0095]-[0098]).

Regarding claim 5, Blow et al further teaches wherein, for a defined amount of pulse amplification by the optical amplifier, the adequate length of the normal dispersion fiber for a suitable power level at a fiber output is determined by the trade-off between the effects of dispersion, non-linearity and attenuation in the fiber(i.e., Fig. 1, page 4, paragraphs [0058]-[0064], page 5, paragraphs [0071]-[0073], and page 7, paragraphs [0095]-[0098]).

Regarding claim 6, Blow et al further teaches wherein the unbalanced interferometer is a Sagnac interferometer(i.e., Fig. 1, page 4, paragraphs [0058]-[0064], page 5, paragraphs [0071]-[0073], and page 7, paragraphs [0095]-[0098]).

Regarding claim 7, Blow et al further teaches wherein the interferometer is a non-linear loop mirror (i.e., Fig. 1, page 4, paragraphs [0058]-[0064], page 5, paragraphs [0071]-[0073], and page 7, paragraphs [0095]-[0098]).

Regarding claim 8, Blow et al further teaches wherein the non-linear loop mirror comprises a 2x2 optical coupler, a first port on one side of the coupler forming an input to the non-linear loop mirror, a second port on the one side forming an output to the non-linear loop mirror, and ports on another side of the coupler being connected together by a section of optical waveguide, to form a waveguide loop (i.e., Figs. 1 and 4-6, page 4, paragraphs [0058]-[0064], page 5, paragraphs [0071]-[0073], and page 7, paragraphs [0095]-[0098]).

Regarding claim 9, Blow et al further teaches wherein the optical coupler is one of the following: a fiber optic coupler and a semiconductor waveguide device, and the optical waveguide comprises at least one of the following: a section of the optical fiber

and a section of semiconductor waveguide (i.e., Figs. 1 and 4-6, page 4, paragraphs [0058]-[0064], page 5, paragraphs [0071]-[0073], and page 7, paragraphs [0095]-[0098]).

Regarding claims 10 and 20-24, Blow et al further teaches wherein the non-linear loop mirror is one of the following: an absorption non-linear loop mirror, comprising an absorption element asymmetrically located within a fiber loop: an amplifying non-linear loop mirror, comprising an optical amplifier asymmetrically located within a fiber loop: a dispersion unbalanced non-linear loop mirror: and an unbalanced coupler non-linear loop mirror (i.e., Figs. 1 and 4-6, page 4, paragraphs [0058]-[0064], page 5, paragraphs [0071]-[0073], and page 7, paragraphs [0095]-[0098]).

Regarding claim 11, Blow et al further teaches wherein the non-linear loop mirror operates within a region of its switching curve in which the output power of the non-linear loop mirror is substantially stable against small changes in output power from the optical pulse reshaper (i.e., Fig. 1, page 4, paragraphs [0058]-[0064], page 5, paragraphs [0071]-[0073], and page 7, paragraphs [0095]-[0098]).

Regarding claim 12, Blow et al further teaches wherein the non-linear loop mirror operates in a region after a first peak of its switching curve (i.e., Fig. 1, page 4, paragraphs [0058]-[0064], page 5, paragraphs [0071]-[0073], and page 7, paragraphs [0095]-[0098]).

Regarding claim 13, Blow et al further teaches wherein the optical amplifier adjusts pulse power to a level for input to the saturable absorber which is after a first peak of its switching curve of the non-linear loop mirror (i.e., Figs. 1 and 4-6, page 4,

paragraphs [0058]-[0064], page 5, paragraphs [0071]-[0073], and page 7, paragraphs [0095]-[0098]).

Regarding claim 14, Blow et al further teaches wherein a loop length of the non-linear loop mirror is determined in terms of input power to the non-linear loop mirror (i.e., Fig. 1, page 4, paragraphs [0058]-[0064], page 5, paragraphs [0071]-[0073], and page 7, paragraphs [0095]-[0098]).

Regarding claim 15, Blow et al further teaches wherein the non-linear loop mirror comprises a loop of dispersion-shifted fiber (i.e., Figs. 1 and 4-6, page 4, paragraphs [0058]-[0064], page 5, paragraphs [0071]-[0073], and page 7, paragraphs [0095]-[0098]).

Regarding claim 16, Blow et al further teaches wherein the optical amplifier is a lumped erbium-doped fiber amplifier or a distributed Raman fiber amplifier (i.e., Figs. 1 and 4-6, page 4, paragraphs [0058]-[0064], page 5, paragraphs [0071]-[0073], and page 7, paragraphs [0095]-[0098]).

4. Claims 1, 2, 4-9, 19, 25 and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Watanabe (US Patent No. 6,424,773)

Regarding claims 1, 19 and 25, referring to Figure 10, Watanabe teaches an optical pulse regenerator comprising:

an optical pulse reshaper (i.e., a section of dispersion managed optical fiber transmission line 50, Fig. 10) for broadening temporal widths and flattening center

portions of an optical pulse (i.e., Fig. 10, col. 5, lines 24-39, col. 13, lines 10-67 and col. 14, lines 1-14);

a saturable absorber (i.e., a gate device 46 that comprises ab unbalanced optical interferometer/non-linear loop mirror (NOLM), Fig. 10, col. 5, lines 24-39, col. 13, lines 10-67 and col. 14, lines 1-14) coupled to the optical pulse reshaper; and

an optical amplifier coupled to the optical pulse reshaper (i.e., Fig. 10, col. 5, lines 24-39, col. 13, lines 10-67 and col. 14, lines 1-14).

Regarding claims 2 and 26, Watanabe further teaches where the optical pulse reshaper includes a section of normal dispersion fiber (i.e., Fig. 10, col. 5, lines 24-39, col. 13, lines 10-67 and col. 14, lines 1-14).

Regarding claims 4 and 6, Watanabe further teaches wherein the saturable absorber includes an unbalanced optical interferometer (i.e., Fig. 10, col. 5, lines 24-39, col. 13, lines 10-67 and col. 14, lines 1-14).

Regarding claim 5, Watanabe further teaches wherein, for a defined amount of pulse amplification by the optical amplifier, the adequate length of the normal dispersion fiber for a suitable power level at a fiber output is determined by the trade-off between the effects of dispersion, non-linearity and attenuation in the fiber (i.e., Fig. 10, col. 5, lines 24-39, col. 13, lines 10-67 and col. 14, lines 1-14).

Regarding claim 7, Watanabe further teaches wherein the interferometer is a non-linear loop mirror (i.e., Fig. 10, col. 5, lines 24-39, col. 13, lines 10-67 and col. 14, lines 1-14).

Regarding claim 8, Watanabe further teaches wherein the non-linear loop mirror comprises a 2x2 optical coupler, a first port on one side of the coupler forming an input to the non-linear loop mirror, a second port on the one side forming an output to the non-linear loop mirror, and ports on another side of the coupler being connected together by a section of optical waveguide, to form a waveguide loop (i.e., Fig. 10, col. 5, lines 24-39, col. 13, lines 10-67 and col. 14, lines 1-14).

Regarding claim 9, Watanabe further teaches wherein the optical coupler is one of the following: a fiber optic coupler and a semiconductor waveguide device, and the optical waveguide comprises at least one of the following: a section of the optical fiber and a section of semiconductor waveguide (i.e., Fig. 10, col. 5, lines 24-39, col. 13, lines 10-67 and col. 14, lines 1-14).

Regarding claim 16, Watanabe further teaches wherein the optical amplifier is a lumped erbium-doped fiber amplifier or a distributed Raman fiber amplifier (i.e., Fig. 10, col. 5, lines 24-39, col. 13, lines 10-67 and col. 14, lines 1-14).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 3, 10-15, 20-24 and 27-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe (US Patent No. 6,424,773) in view of Evans (US Patent No. 6,587,606).

Regarding claims 3, 27 and 31, Watanabe differs from claims 3, 27 and 31 in that he fails to specifically teach the section of normal dispersion fiber has a negative dispersion coefficient. Evans, from the same filed of endeavor likewise teaches an optical regenerator (Figures 1-3). Evans further teaches the section of normal dispersion fiber has a negative dispersion coefficient (i.e., Figures 1-3, col. 6, lines 50-59). Based on this teaching, it would have been obvious to one having skill in the art at the time the invention was made to incorporate the section of normal dispersion fiber has a negative dispersion coefficient as taught by Evans in the system of Watanabe. One of ordinary skill in the art would have been motivated to do this since allowing compensating the dispersion of the optical signal.

Regarding claims 10, 20-24 and 32, the combination of Watanabe and Evans teaches wherein the non-linear loop mirror is one of the following: an absorption non-linear loop mirror, comprising an absorption element asymmetrically located within a fiber loop: an amplifying non-linear loop mirror, comprising an optical amplifier asymmetrically located within a fiber loop: a dispersion unbalanced non-linear loop mirror: and an unbalanced coupler non-linear loop mirror (i.e., Fig. 10 of Watanabe and Figs. 1-3 of Evans).

Regarding claims 11 and 28-30, the combination of Watanabe and Evans teaches wherein the non-linear loop mirror operates within a region of its switching

curve in which the output power of the non-linear loop mirror is substantially stable against small changes in output power from the optical pulse reshaper (i.e., Fig. 10 of Watanabe and Figs. 1-3 of Evans).

Regarding claim 12, the combination of Watanabe and Evans teaches wherein the non-linear loop mirror operates in a region after a first peak of its switching curve (i.e., Fig. 10 of Watanabe and Figs. 1-3 of Evans).

Regarding claim 13, the combination of Watanabe and Evans teaches wherein the optical amplifier adjusts pulse power to a level for input to the saturable absorber which is after a first peak of its switching curve of the non-linear loop mirror (i.e., Fig. 10 of Watanabe and Figs. 1-3 of Evans).

Regarding claim 14, the combination of Watanabe and Evans teaches wherein a loop length of the non-linear loop mirror is determined in terms of input power to the non-linear loop mirror (i.e., Fig. 10 of Watanabe and Figs. 1-3 of Evans).

Regarding claim 15, the combination of Watanabe and Evans teaches wherein the non-linear loop mirror comprises a loop of dispersion-shifted fiber (i.e., Fig. 10 of Watanabe and Figs. 1-3 of Evans).

7. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe (US Patent No. 6,424,773) in view of Gray et al (Pub. No.: US 2003/0035207).

Regarding claim 17, Watanabe differs from claim 17 in that he fails to specifically teach a section of normal dispersion fiber which acts as an amplifying medium.

However, Gray et al teaches a section of normal dispersion fiber which acts as an amplifying medium (i.e., Figures 1 and 2, pages 2 and 3, paragraphs [0022]-[0023]). Based on this teaching, it would have been obvious to one having skill in the art at the time the invention was made to incorporate the section of normal dispersion fiber which acts as an amplifying medium as taught by Gray et al in the system of Watanabe. One of ordinary skill in the art would have been motivated to do this since allowing compensating the dispersion of the optical signal and increasing the power level of the optical signal to a desired level.

Regarding claim 18, the combination of Watanabe and Gray et al teaches wherein the Raman fiber amplifier is one of the following: bidirectionally pumped by a forward pump and a backward pump; or pumped with one pump in a single direction, which is one of the following: co-diectionally with a propagating signals; and counter-directionally (i.e., Figures 1 and 2 of Gray et al), pages 2 and 3, paragraphs [0022]-[0023]).

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Watanabe et al (US Patent No. 7,076,174) discloses optical regenerator.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hanh Phan whose telephone number is (571)272-3035.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye, can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-4700.

/Hanh Phan/

Primary Examiner, Art Unit 2613